

1. Write the definition of the Laplace transform of a function $f(t)$:

$$\mathcal{L}\{f\}(s) =$$

2. Using the definition, find the Laplace transform of the following functions:

a. $f(t) = t$

b. $f(t) = \begin{cases} 0, & 0 \leq t \leq 1 \\ e^{-2t}, & 1 < t \end{cases}$

c. $f(t) = \begin{cases} t^2, & 0 \leq t \leq 1 \\ 5 - t, & 1 < t \leq 2 \\ 6, & 2 < t \end{cases}$

d. $f(t) = \cos bt$

e. $f(t) = te^{at}$

f. (*difficult*) $f(t) = t^n e^{at}$